# Assessment and Recommendations for Bull Toad's Pond at Green Island Common

## Final Report to NHEP

## Submitted by Tracy Degnan, RCCD, 2002

## **Executive Summary and Introduction**

The purpose of this project was to inventory and evaluate Bull Toad's Pond, located at the Great Island Common in New Castle. In this report the phrase 'Bull Toad's Pond' is intended to include the pond and the shallow water wetland system that surrounds the pond. The original scope of this project was directed at a detailed analysis and review of existing available data, field determinations, and an analysis of the current conditions of Bull Toad's Pond. In addition, the purpose of this project was to offer recommendations of alternative solutions for restoring the functions and values of this degraded salt marsh at the Great Island Common.

## **Project Goals and Objectives**

The project involved three main phases including:

- 1) Review of existing available data, historical information, and previous analysis completed at Bull Toad's Pond.
- 2) Assemble existing information and complete an analysis on the wetland functions and values, and a stormwater assessment analysis. Hold public meetings to discuss possible restoration and/or enhancement alternatives; and
- 3) To compile a final report and submit it to the Town of New Castle, New Hampshire Coastal Program, New Hampshire Estuaries Project and the Natural Resources Conservation Service (NRCS).

It is important to note that tidal wetlands are of great ecological value for wildlife habitat and support fisheries, and are relatively small in quantity in the State of New Hampshire. Past ignorance of their importance led to the degradation and/or destruction of most of the tidal marshes in the northeastern United States. Restoring a tidal wetland in close proximity to a sand dune and pitch pine barren, all located at Bull Toad's Pond, would provide a superior

opportunity for education, and offer a glimpse of what the seacoast must have looked like in the distant past. These habitat types are unusual in New Hampshire because of development pressure, and the plants and animals that inhabit them are threatened by habitat loss. Restoration of these habitats will provide protection for the species of concern known to be at the site and provide potential habitat for other species at risk.

This report considers wetland restoration and ecological enhancement options available for Bull Toad's Pond, located at the Great Island Common in New Castle, New Hampshire. The Rockingham County Conservation District (RCCD) in conjunction with the technical team evaluating this resource made several recommendations, and if requested, will assist the town in a technical capacity in the future. However, the final decision as to which course of action is appropriate will rest with the town, and must be developed based on broad support of the parties involved. With the information, inventory, and alternatives presented during this project, it is hoped that the Town of New Castle will take action to rehabilitate and manage this wetland system as a viable, functioning ecosystem.

Map 1

Location Map, USGS

## The History of Bull Toad's Pond

## **Historical Information**

Very little documentation regarding the use and history of Bull Toad's Pond has been located. Due to the lack of documentation regarding uses and overall history of the site, several residents and neighbors have been contacted requesting their recollection of what occurred on or near the Bull Toad's Pond site. These personal accounts have been summarized and grouped together where they make the most sense. When several of the same types of comments were made, these personal perspectives were included. In addition a document titled *The White Family*, produced by Fred S. White (New Castle resident), has been provided for this report and also has references to Bull Toad's Pond. Please note that there was no method to validate the authenticity of any of this information for this report, it is included as a component of this report to help understand the past history and use of the general area (see Appendix A). In addition, a publication titled *A Native Looks at New Castle, N.H.*, produced by Dorothy M. Becker (1975) contains a few photographs and a small amount of textual description for the Great Island Common, and includes a reference to Bull Toad's Pond. This information has been useful for appreciating some of the physical dynamics of Bull Toad's Pond, and it may be useful for determining appropriate restoration techniques.

# Maps, Plans and Reports

There are several historical maps that have been retrieved and are referenced in this report. The oldest historical map that was located is a map produced on August 1, 1941 completed for the Harbor Defenses of Portsmouth, N.H. titled, Camp Langdon, Camp Development Plan combined with survey, that was prepared for the Constructing Quartermaster by Sidney N. Shurcliff, Landscape Architect at a scale of 1" = 50'. This plan shows the entire area, formerly known as Camp Langdon, and includes a survey of all building locations, and a survey of existing and proposed plantings. Another historical map that has been of interest includes the Camp Langdon New Castle, N.H. General Layout Map, produced in July of 1944 by the United States Engineers, Area Engineers Office, Harbor Defense of Portsmouth at a scale of 1" = 50'. This is a general base map showing fences, electric poles, transformers, valves, manholes, catch basins, structures, and includes some surveyed dimensions. Another surveyed map called Plan of a Portion of Former Camp Langdon, New Castle, New Hampshire (Drawing No. RE-129) was produced in September 6, 1961 by the Department of the Navy, Bureau of Yards and Docks, District Public Works Office, First Naval District, Boston, Mass. This surveyed map shows the former extent of Bull Toad's Pond containing approximately 100,000 sq. ft. at a scale of 1" = 100'. In addition, in March of 1986, James W. Sewall Company of Old Town, Maine produced a Wetlands Map for the Office of State Planning, New Hampshire using aerial photogrammetry (reference number 6105-1-26). This map corresponds to a report also produced for the Office of State Planning titled "Phase 2 Report, Coastal Wetlands Mapping Program", that contains a delineation of the wetland complexes in New Castle, and detailed wetland descriptions. In addition, another base map for the Town of New Castle, New

Hampshire, prepared for the New Castle Board of Selectmen by Avis Airmap, Inc. at a scale of 1" = 200' with 5' contour intervals is available for review. This map is referenced as Avis Proj. No. 7569, although the date the map was produced is uncertain. The most recent map of the general area includes the Plan of Proposed Cemetery, New Castle Common, Wentworth Road, New Castle, New Hampshire for Town of New Castle produced by James Verra and Associates, Inc. at a scale of 1" = 40', dated February 1, 1999, and recorded at the Rockingham County Registry of Deeds (# D-27526). This also shows a portion of Bull Toad's Pond as of 1999. In addition, a copy of the Town Tax Map, although only valid for planning purposes, shows a portion of Bull Toad's Pond. Tax Map 5 Lot 13 and has been included in the appendix (see Appendix B) as a reference. The appendix does not contain copies of the above-mentioned plans and maps, due to their size. These maps and plans are readily available at the Town Hall of New Castle. Comparing these various maps offers a visual evaluation of the pond, and the surveyed plans demonstrate the different sizes and shapes of Bull Toad's Pond throughout these periods of time.

There are three deeds that are referenced at the end of this report, that signify the transfer of property from the United States of America, Administrator of General Services to the Town of New Castle for the continuous use and maintenance of the premises...for public park and recreational purposes. These deeds were transferred in 1960, 1963 and 1967 and are also available at the Rockingham County Registry of Deeds or the Town Hall of New Castle.

Two other reports that were important to review for this project include the *Soil Survey of New Hampshire Tidal Marshes*, University of New Hampshire, USDA, Soil Conservation Service, October 1974, and the *Evaluation of Restorable Salt Marshes in New Hampshire*, USDA, Soil Conservation Service, October 1994.

#### **Historical Narrative**

A portion of the land that includes a small portion of land where Bull Toad's Pond is situated is land that was once owned by the Pepperell family, who are direct descendents of the White Family. This land was swapped some time during the seventeenth or eighteenth century for land that was owned in Biddeford in Scarborough, Maine. During that time period there was thought to be only one house on the Beach Hill Road side of Bull Toad's Pond, a summerhouse owned by the Hackett family. There was also a windmill that pumped water from Bull Toad's Pond into the Hackett's attic for water used to flush and wash. This house was destroyed in a fire that took place in 1924. In another three years (1927) the Butterworth family bought this property, brought fill into the area, let water out of Bull Toad's Pond to make it smaller, and developed the property.

Around this point in time, the road known as Beach Hill Road was built for the first time, sometime after World War II. In addition, a stormdrain was placed in the road while the road was being built. When this construction was in process, a ditch was created to allow the water from Bull Toad's Pond to flow

out. It is estimated that when this ditch was created, the sandy soil eroded quickly, and allowed the ditch to increase in size.

The land area now known as the Great Island Common was once owned by the Wendell family, until about 1910. The Wendell family had a home on this property, however the United States Government took over this property to build the army camp known as "The New Reservation." The United States Department of the Army built barracks during World War I, which were then removed in 1927. The United States Army then rebuilt barracks for World War II.

There was once an icehouse located close to Bull Toad's Pond, and the U.S. Army used to cut ice from the pond. Some residents remember seeing eels trapped within the ice blocks. Residents generally remember that the ditch or trench that extends from Bull Toad's Pond toward the ocean was generally kept open. In addition, there may have been another smaller pond located on the Great Island Common land. It has been noted that a large storm that occurred somewhere around 1953 that knocked down a number of trees that had existed in this area. Some residents indicated that many of the existing trees at the Great Island Common might only be 50 years old.

Generally, residents remember Bull Toad's Pond being much larger than it currently is, perhaps two to three times as large. This is also demonstrated through examination of the older surveyed plans of the area. Residents remember that at one time the pond was approximately 10' from the edge of Beach Hill Road. Generally, residents also remember being able to skate on Bull Toad's Pond during cold winter months, and there was one area on the southerly side of the pond that did not freeze. There is speculation that a natural spring emptied into the pond in that vicinity. In addition, there has been fill placed in this general area (southerly/south westerly side of the Bull Toad's Pond), although the details of when or what type of fill has been placed there is unknown. Residents have seen construction debris including concrete slabs, tin, and shingles located along the edges of Bull Toad's Pond.

## Recent past

Residents remember that Bull Toad's Pond is filled with water, and that it empties out at different times of the year. There are times when the water level is very low, and other years that there has been more water contained within the pond. During large storms there has been wave action that has brought salt water into the pond. At times, with very large storms, this wave action can wash over the pond completely.

There are no current town records of any pipes that flow into the pond. The public works department has cleaned the beach, raked the seaweed off of the beach, and have at times dragged logs that wash

ashore, and placed them within the ditch to keep them off of the beach grass. At different times there have been logs in the ditch, and other times there have been no logs in the ditch.

In addition, there is some recollection that there were three pipes (possibly metal) placed in a vertical position, offset, at the ditch/inlet area, perhaps sometime in the late 1980's, although there is no obvious indication of them now.

Moreover, at some point in time an overflow pipe was installed above the ground within the outlet area. This overflow pipe extends from Bull Toad's Pond (through the ditch) toward the ocean, although it is doubtful that this functions properly. This small white pipe may be 3" in diameter or less and probably plastic. This pipe has been documented, (see photograph 1 and 2 dated March, 2001) where water flowed out of the pipe during very heavy rain and snowmelt.

In the early 1970's, a couple of residents put sand bags in the ditch, however they were removed shortly thereafter. Also during the blizzard of 1978, the ocean washed over Bull Toad's Pond completely, and the ocean water went through the pond up to Wentworth Road.

It has been suggested that the wind sheer that took place in 1991 that severely impacted the Stratham Hill Park area also impacted Bull Toad's Pond, and perhaps additional significant sand deposits were placed in the pond during this event.

Additional stone may have been dumped in the inlet/ditch area – approximately 6" stone prior to 1989, although there is no obvious sign of that now. Generally there is a concern with the amount of purple loosestrife that has recently taken over the pond vicinity.

#### PHOTOGRAPHS 1 & 2

Pipe and Overwash from Bull Toad's Pond, March 2001





# 1998 Beach Hill Road Construction/Utilities Project

There were no permits for the 1998 road construction project (underground utilities were installed, in the road that including telephone lines). No town information was gathered/completed for inspection of any work completed during this project. A New Hampshire Wetlands Bureau Wetlands application was not submitted due to Bull Toad's Pond being considered a freshwater wetland. The Beach Hill Road Association also installed stormdrains during this construction project. Existing drains along Beach Hill Road were tied into the main stormdrain located on Beach Hill Road, and an extension was then directed to Bull Toad's Pond at the southwesterly corner of William Williams land. This stormdrain empties in the vicinity of the riprap retaining wall located on the north side of Bull Toad's Pond, approximately 4-5 feet in from the westerly side of the headwall (the pipe is probably 6-8" pvc). Additionally, rocks were placed on the north side of the pond (adjacent to Williams' land) to help stabilize the area.

After the project was completed, the New Castle Conservation Commission completed a site walk, and identified that wetland vegetation had been impacted during the construction project. The New Castle Conservation Commission then requested that rocks that had been disturbed along Bull Toad's Pond be rearranged in a more suitable and natural manner. The Beach Hill Road Association complied with the New Castle Conservation Commission's request.

## **Recent Observations**

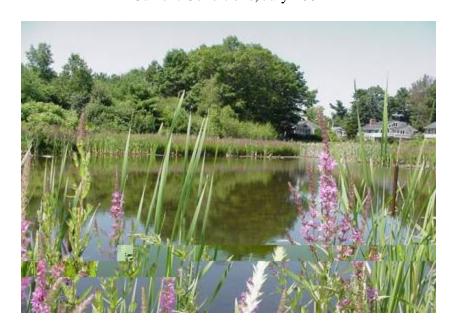
There are concerns that there have recently been very dry years, where the water level of the pond seems to be getting extremely low and even drying up. The general consensus of residents is that Bull Toad's Pond is no longer fed by a spring.

The management of the Bull Toad's Pond area within Great Island Common has been minimal. Some Stag-horn Sumac located in close proximity to Bull Toad's Pond has been cut down. Generally, there are concerns that some of the debris at the edge of the pond that has been filled in this area may be a liability to the community.

Generally, individuals commented on seeing more erosion than in the past and higher tide lines. In addition, the level of sand along the ocean side of Bull Toad's Pond has been reported to be at a higher level than in the past.

Photograph 3

Current Conditions, July 2001



## **Methods**

## Published Natural Resource Data

Published natural resource data for the area was reviewed. Copies of the material referenced here are found in Appendix C.

- 1) The US Fish and Wildlife Service's National Wetlands Inventory (NWI) map shows Bull Toad's Pond as a fresh water pond with an unconsolidated bottom that is permanently flooded.
- 2) The USDA Soil Conservation Service's Soil Survey of Rockingham County, New Hampshire shows the area as Ipswich mucky peat and beaches. Ipswich mucky peat is a soil that forms in tidal marsh deposits from partially decayed plant and animal matter. Peat is the name for more fibrous, less decomposed organic deposits, and muck is the name for more decomposed, finer organic deposits.

## 3) The 1974 publication Soil Survey of Tidal Marshes in New Hampshire

describe the soils in this area as Lithic Sulfihemists, which is 16 to 50 inches of organic soil material over bedrock. These soils only form in tidal environments.

Review of this published natural resource data illustrates that the two soil surveys show that the site is connected to the ocean, and shows soils that develop in a salt-water environment. Some of the aerial photos reviewed clearly show a break in the dune through which this connection could have occurred. Some of the historical aerial photos do not show a connection, or are indistinct in this regard. The NWI map describes a fresh water pond with no connection to the ocean.

Because of its location in the landscape, we know that Bull Toad's Pond must change over time slowly, and must also make large, sudden ecological shifts in response to storm events. The date on which the pond is observed may account for the differences described in the published literature above. Also, the scale at which the above maps are prepared affects the level of detail they can show and the amount of attention that can be given to a specific soil or wetland delineation.

Comparisons of aerial photos (1974, 1977, and 1986) and old surveys (1944, 1961, and 1999) show Bull Toad's Pond being different sizes and shapes. Obviously, the size and shape of the water surface varies with the recent weather and the time of year the photos were taken. The edge of the pond shown in different surveys could vary if one survey measured the open water and another measured the flooded vegetation.

## Site Description

Bull Toad's Pond is a shallow pond behind a sand dune, south of Beach Hill Road at the northeastern corner of Great Island Common. At the time of this investigation it supports freshwater vegetation and some plants that are tolerant of brackish water. The entire wetland is about one acre, and the open water component of the wetland is about one-third of an acre.

There are reports from local residents and physical evidence that the pond has been filled by human activity in the past. This may account for some of the differences in size and shape of the wetland found in the historical photos and surveys. Fill appears to have been placed along the northern and southern edges of the wetland. The fill along the Beach Hill Road (northern) side of the wetland appears to be blasted rock. The fill along the Great Island Common (southern) side of the wetland appears to be blasted rock, construction debris, and masonry,

which may be the remains of the Camp Langdon buildings. The fill can be observed by walking over the site, particularly when the vegetation is dormant. The uneven surface immediately south of the wetland is also a clue that this area has been filled in the past.

After review of the available evidence, an estimate of one-third to one-half of the former wetland has been filled by human activity. To accurately determine the historical extent of the wetland would require further on-site investigation, which is beyond the scope of this project.

A generalized vegetation cover type map is provided that shows the dominant species and approximate extent of surface water on the date of the field work, 20 July 2001. The Normandeau Associates study from 1986 shows many of the same species as found on the site today, though more undesirable species are now present than were in 1986. The native plant communities one would hope to find in this type of environment are degraded by the presence of undesirable invasive species. Comparing the Normandeau study with the data collected this year indicates that the problem of invasive species is worsening.

A simple elevation cross section was made from the pond to low tide, and is provided. The difference between high and low tide is about ten feet on this day and on average, using tide charts from nearby locations. There was about 3.5 feet of water in the pond at the deepest point when the fieldwork was completed. More than three feet of muck was found under portions of the pond. Note that the bottom of the pond water at the deepest point is approximately at the average high tide elevation.

"Muck" is highly decomposed organic material. Plants and animals which die and fall into water decompose more slowly and by different means that those which fall on dry ground, primarily because of the lack of oxygen, reduced sunlight, and cooler temperatures. Muck is more decomposed than peat. Peat is more fibrous and the partially decomposed plants parts are more recognizable when peat is examined closely.

The presence of muck in Bull Toad's Pond does not reveal whether in recent history the pond was a freshwater or saltwater habitat. Muck can form under either habitat, and could continue to form as the site switches back and forth between fresh and salt water over its history, as long as it remains wet. Whether the wetland is fresh or salt water does have a noticeable influence on the type of vegetation growing there, because of the changes in the chemistry of the water flowing through the soil.

Judging from the historic information, the depth of peat, and the landscape position, it is very likely that Bull Toad's Pond was a tidal marsh that has been cut off from tidal flow by the

formation of the dune. It then changed to an overwash marsh pond that would alternate on an irregular schedule between fresh and salt water. As the dune grows in size, the salt-water inundations become less frequent. The overwash marsh pond experiences wide swings in salinity, which are reflected by flora and fauna that can withstand, avoid, or internally regulate these changes. It may still experience large salt-water inundations related to significant storms that overwash or breach the dune. If these inundations do not happen during the growing season, the vegetation will not reflect them.

The overwash pond habitat type is unusual because it occurs in very specific physical settings, wetlands next to the ocean behind a low dune. These same settings are highly manipulated by humans, and occur in the portions of the state that have been settled the longest. Furthermore, both the natural evolution of the dune and the irregular salt-water inundations of the overwash marsh pond are interrupted by human efforts to stabilize their surroundings.

Photographs 4 & 5

Past Conditions, Summer, Mid 1990's





## **Results and Discussion**

Bull Toad's Pond Area Cover Type Description

(1) Open water shallow pond;

1.0 to 3.5 feet of water on July 20th, 2001

Cowardin classification PAB3FG....

Palustrine, aquatic bed, rooted vascular plants (Coontail, *Ceratophyllum demersum* dominant), semi-permanently flooded, organic soils.

(2) Marsh fringe around shallows of pond;

0.0 to 1.5 feet of water on July 20th, 2001

Cowardin classification PEM1E....

Palustrine, Emergent, persistent vegetation (purple loosestrife *Lythrum salicaria* dominant), seasonally flooded/saturated.

Other plant species present in large numbers are narrow leaf cattail (*Typha angustifolia*) and common-reed (*Phragmites australis*).

(3) Sand dune remnant;

Beach Grass (*Ammophilia breviligulata*) \* dominant; modest amount of invasive species evident.

(4) Sand dune remnant;

Dominated by species other than dune grass and invasive species including stag-horn sumac (*Rhus typhina*), poison ivy (*Toxicodendron radicans*), sea rocket (Cakile edentula), charlock (*Brassica kaber*), beach pea (*Lathyrus japonicus*), and coast blite (*Chenopodium rubrum*).\*

(5) Suspected areas of fill with early successional and undesirable plant species including stag-horn sumac, white pine (*Pinus aritim*), aspen (*Populus sp.*), buckthorn (*Rhamnus frangula*), poison ivy, climbing bitter-sweet (*Celastrus scandens*), raspberry (*Rubus idaeus*), and Virginia creeper (*Pathenocissus quinquefolia*).

\* Species rare in New Hampshire

## Overwash Marsh System Description

The only other overwash marsh system that occurs in New Hampshire is at the Odiorne Point State Park in Rye. A general description of this system has been completed by the New Hampshire Natural Heritage Inventory in 1992 and is as follows:

Coastal salt pond marsh (G4 S1)

General Description/Ecological Processes: This community includes emergent marshes that are seasonally flooded with freshwater and periodically infused with salt water during storm events. It is presently known from a single site in New Hampshire. Water chemistry is characterized by a brackish to slightly brackish salinity and an average pH of 8.2. The marsh is separated from the coastal shoreline by a cobble ridge rising up to 12 ft. above mean sea level. The northern end of this ridge drops to approximately 7.5 ft. above mean sea level and shows recent evidence of wave action overtopping the barrier and depositing salt water and small amounts of sand into the marsh. The southern end of the cobble ridge is slightly higher (9-10 ft. above mean sea level) and has several furrows on its backside formed from breaching storm waves.

Soils/Geology/Hydrology: The seasonally flooded soils consist of a 25 cm thick O horizon overlying a gravelly silt loam containing scattered coarse sand. Depth to bedrock (Rye Formation) in one soil pit was 35 cm. Scattered outcrops lie exposed in the marsh. Soil water salinity generally ranges from greater than 0.5 parts per thousand (ppt) to less than 18 ppt (oligo- to mesohaline). Salinity levels greater than or equal to 18 ppt (poly-to euhaline) typically support salt marsh. Freshwater emergent marshes occur where salinity levels are 0.5 ppt or less during the period of annual low freshwater flow. Salinity levels may fluctuate seasonally and over several years in response to freshwater input, evaporation, and periodic infusion with salt water during storm events.

Characteristic Vegetation: Vegetation appears to be zonally distributed along water-related gradients (flooding/saturation duration and salinity). The marsh is dominated by clonal stands of Typha angustifolia (narrow-leaved cat-tail) and Scirpus tabernaemontanii (soft-stemmed bulrush). Lower areas exposed later in the growing season after drawdown are dominated by Eleocharis parvula (small spikerush)\*, in association with Eleocharis halophila (salt-loving spike-rush)\*, Eleocharis flavescens var. olivacea (olive-brown spike-rush), Scirpus maritimus (alkali-bulrush), and Scirpus pungens (three-square rush). Spartina pectinata (fresh-water cord-grass) is abundant on higher ground along the basin edge. Other rare plants occurring in this marsh include Chenopodium rubrum (coast-blite)\* and Zannichellia palustris (horned pondweed)\*. Straus (1992) found horned pondweed was found here in

1992, but it was not seen in 1997.

Other characteristic brackish marsh species include Plantago aritime (salt marsh plantain), Solidago sempervirens (seaside goldenrod), Phragmites australis (common reed), Agrostis stolonifera var. palustris (marsh creeping bent-grass), and Aster novi-belgii (New York aster). Many of these species occur in both fresh and brackish water habitats, but when found together, they denote brackish conditions. Several other species found only in freshwater habitats are restricted to higher ground along the basin edge where plant diversity is highest. The uncommon Lythrum hyssopifolia (hyssop-leaved loosestrife) and Spartina caespitosa (marsh cord-grass) also occur here.

Distribution: Odiorne Point State Park, Rye (Gulf of Maine Coastal Lowland subsection).

Comments: Composition and distribution of many of the plants are likely changing in response to variable precipitation and saltwater intrusion during storm events. Other coastal salt pond marshes are likely to have occurred along the coast prior to development.

Good Examples: Odiorne Point State Park (Rye) has the only known occurrence.

\* Species rare in New Hampshire

Sources: NH Heritage field surveys; Straus (1992). Prepared by Bill Nichols.

Photographs 6 &7
Winter Conditions, March 2001





## Current Wetland Functions and Values of Bull Toad's Pond

Numerical quantification of the ecological functions and societal values of a single wetland, without reference to other wetlands, is not meaningful. The scope of this study does not allow the development of a reference database of comparable wetlands. There may also be very few comparable wetlands to use.

Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire was used as a guide to develop the following brief qualitative estimates of wetland functions and values. The wetland is a freshwater wetland system at this time, and is being evaluated as such. The position in the landscape indicates this is an overwash marsh pond that is infrequently flooded by salt water during storm events.

Ecological Integrity:

Low

It is estimated that one-third to one-half of the former wetland has been filled by human activity. Invasive and undesirable plants are numerous and widespread. In addition, road runoff runs untreated into the wetland.

Wetland Wildlife Habitat:

Moderate

This fresh water pond in close proximity to the ocean provides waterfowl habitat. Dense vegetation along the pond fringe provides refuge from predators. High human use in nearby uplands lessens this value.

Finfish Habitat:

Low

No permanent connection to the ocean or influent stream. Shallow water leads to low oxygen conditions in summer, limiting usefulness to fish.

Educational Potential:

Low

The area does not exhibit native vegetation communities, with the exception of the dune grass that dominates the northern portion of the dune. In addition to the invasive and undesirable species, there is considerable poison ivy (Toxicodendron radicans) that represents a hazard to visitors. The viewing location would have a negative impact on the sand dune. The viewing location on town property is not handicapped accessible.

Visual/Aesthetic Quality:

Moderate

The pond is an unusual landscape feature next to the ocean and does provide visual contrast.

Water-Based Recreation: Low

The pond has been used for ice-skating. The pond lacks significant fishing opportunities. Duck hunting is unlikely because two houses are in close vicinity to the pond. The water body is too small for boating.

Flood Control Potential: NA

Since the Atlantic Ocean is located immediately downstream of the pond there is no potential that the pond could provide any flood control.

Ground Water Use Potential: Low

The area is likely underlain by saline water that is not potable. New Castle is served by municipal water service from Portsmouth.

Sediment Trapping: High

Sediments that enter the water cannot leave unless the dune is breached, which may occasionally happen during large storm events. Fine sediments may be transported out of the wetland in limited quantities by wind. Fine sand that blow off the dune and beach are trapped in the wetland.

Nutrient Attenuation: High

Unnaturally high levels of nutrients may enter the wetland with runoff water from Beach Hill Road. This would include both sheet flow across the surface and discharge from the storm drainage system, which residents report empties at the north side of Bull Toad Pond. Sources of nutrients are fertilizer, grass clippings, animal feces, and phosphorus runoff from paved surfaces. Nutrients that enter the wetland are generally trapped in the organic soils or taken up by plants. Nutrients move most readily by water flow, and water rarely flows out of the wetland system in its current configuration. Nutrients are transformed and exported when wildlife feed on plant materials and leave the wetland.

Shoreline Anchoring and Dissipation of Erosive Forces: High

Density of vegetation, position in the landscape, and proximity of developed areas along Beach Hill Road make the wetland important in this regard.

Urban Quality of Life: Does Not Apply

This wetland is not in an urban environment, as defined.

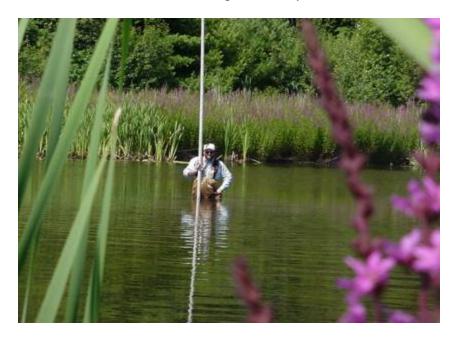
Historical Site Potential: Unknown

The State of New Hampshire, Division of Historical Resources, Department of Cultural Affairs has been contacted and a response is pending.

Noteworthiness: High

This wetland may be an example of a dysfunctional 'Coastal Salt Pond Marsh' as described by the NH Natural Heritage Inventory. This habitat is listed as extremely rare in New Hampshire and demonstrably secure globally. The sand dune adjacent to the wetland system has two plant species of state concern. Beach grass (Ammophila breviligulata) is rare or uncommon in New Hampshire, though widespread and secure globally. Coast-blite goosefoot (Chenopodium rubrum) is imperiled in New Hampshire, though widespread and secure globally. Though not listed by Natural Heritage Inventory, the dynamic overwash pond in close association with a sand dune and remnant pitch-pine (Pinus rigida) barren is unusual in New Hampshire, and is considered significant in this evaluation (see Appendix G).

Photograph 8
Wetland Investigation, July 2001



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#### Threats to Bull Toad's Pond

Bull Toad' Pond will not continue in its present ecological condition if nothing is done. The most immediate threat is invasive, undesirable plant species. Common reed (Phragmites australis) and purple loosestrife (Lythrum salacaria) are numerous along the shallow water fringe around the pond, and are the most immediate concern. The purple loosestrife is widely distributed, though the common reed is concentrated in a dense stand at one location. Staghorn sumac (Rhus typhina) and poison ivy are also widespread and represent a threat. A dense growth of Coontail (Ceratophyllum demersum) is established in the center of the pond. If unchecked, these plants will crowd out other plant species with higher wildlife values, lessen habitat suitable for the plant species of special concern, and close off the open water. Plant diversity will decrease, waterfowl habitat will be lost, and wildlife diversity will decrease.

A secondary threat to Bull Toad's Pond's future if no action is taken is the influent of untreated runoff from Beach Hill Road. This lowers water quality by adding hydrocarbons and heavy metals, which effect wildlife and plant viability. Because of the landscape position of the wetland system, the addition of road salt and sand are probably unimportant in comparison to the sand that blows off the dune and the salt spray from the sea.

Stormwater Analysis

# Sustainable Recharge from Surface Runoff Potential: Medium

With the available data, a rough measure of the contributing drainage area to the pond to be either 11 acres or 14 acres, depending upon whether or not the existing stormdrain system along Beach Hill Road outlets into the pond. With a pond surface area of about 1-acre (including the surrounding wetland), the Drainage Area (DA) to Pond Area (PA) ratio (DA  $\div$  PA) is between 11 and 14. The rule of thumb for determining adequate runoff to sustain a year round adequate pond water surface is between 10 and 20.

## **Sediment Control Potential: Fair to Good**

Based on the flood routing analysis completed, the pond should trap all of the sand and most of the silt associated with the contributing drainage area. This analysis is based upon the approximate data obtained on July 21, 2001, and the 1" = 200' scale topographic map prepared for the Town's Board of Selectmen by Avis Airmap, Inc. The following table summarizes the results:

Storm Frequency	Peak Rate of Inflow	Peak Rate of Outflow	Detention Time
	Cfs	cfs	minutes
2-Year	6.48	0.61	301.3
10-Year	14.85	3.61	159.8
25-Year	20.90	6.81	132.5
50-Year	25.11	10.65	121.6
100-Year	30.72	19.29	106.3

The table's figures are only approximate, the data is shown to the hundredths and tenths only to provide correlation with the computer printout data. The HydroCAD computer printouts are enclosed as Appendix D.

Since the more frequent storms (2-Year frequency or lower) are normally used to measure the efficiency of a structure's ability to trap sediment, this pond has a fair to good detention time. The efficiency of the pond could be improved by installing a slow release structure to further increase its detention time.

Pre-Treatment of Roadway Stormwater Entering the Pond

The following include a description of a few possible stormwater system alternatives for review. Please see Appendix E for diagrams that reference each of these stormwater pretreatment alternatives.

Stormwater Pre-treatment Alternatives:

## Grate Inlet "sox"

Currently some treatment could be afforded with retrofitting the existing catch basin(s) along Beach Hill

Road with Grate Inlet "sox". This type of treatment system requires a considerable amount of maintenance.

## In-Line Structure

Another type of pre-treatment would involve an in-line system. This requires the installation of a structure into the existing storm drain system. The purpose is to treat the "first flush" stormwater runoff (usually designed to handle the 2-year frequency storm). This "first flush" runoff is considered to contain the largest percentage of pollutants. Larger storms by-pass the treatment chamber by the use of baffles.

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## Constructed as a component of the Pond

If the future plan involves dredging Bull Toad's Pond, it is recommended that creating a forebay basin where the outlet pipe from the storm drain system enters the pond be completed. This will protect the major segment of the pond from accumulating sand and sediment. In addition to the forebay being an efficient sand and sediment trap, it would be located in an area that is easily accessible for timely clean out.

#### **Recommendations for Bull Toad's Pond**

Alternatives Considered

Short Term:

- 1) Do nothing It must be recognized that if nothing is done, the Phragmites will get worse, and will likely take over the entire pond. Poison Ivy will also take over the sand dune. Saltwater spray won't kill Poison Ivy, but saltwater will. The Stag-horn Sumac will likely continue to proliferate in the areas that have been filled and will eventually take over.
- 2) Minimal restoration with plant species control of invasive, undesirable plant species.

- a) Cutting some invasive species i.e., Stag-horn Sumac
- b) Herbiciding some invasive species poison ivy; purple loosestrife
- c) Use of Leaf Eating Beetles
- d) Hand removal of species
- e) Mechanical removal of species
- 3) Stormwater Control/Treatment

Runoff from Beach Hill Road enters the wetland without any treatment. If it were possible to treat or redirect stormwater runoff it would be helpful. This could prove impossible considering that the runoff crosses private property through a private drainage system, and discharges into the portion of the wetland that is also on private property. The installation of a gas/oil filter or other pretreatment systems prior to the stormdrain outlet at headwall is a possibility. Verification that water is entering the pond through the pipe at the headwall is necessary, as it may be plugged. Also it is suggested to investigate the potential for diverting storm water away from the pond.

4) Additional wetland/biologist research to document information necessary to report rare plant and/or natural community for inclusion on the Natural Heritage Data list.

Long Term:

- 1) Do nothing see above.
- 2) Extensive Restoration Analysis and Efforts

Restoration of Tidal Flow:

Tidal flow could be achieved through a pipe installed beneath the dune that opens to the

ocean at an elevation below low tide. The elevation of the pipe opening at the pond would determine the frequency of inundation by ocean water. The ocean water would be pushed up the pipe by the incoming tide and would drain as the tide recedes. The pipe would have to be large or it would become clogged with sand. Restoration of tidal flow can assist in the control of invasive species along the margins of the pond. The restoration and enhancement activities described will require state and federal permits.

A portion of Bull Toad's Pond is on private property and the cooperation of those landowners is very important. It is understood that a complete flood hazard study would have to be performed to assure nearby homeowners that flooding would not worsen as a result of the restoration of tidal flow. This would involve a detailed topographic survey, including basement elevations of the nearby homes.

To determine whether it is practical to construct the pipe through the dune, test borings would be done to measure the depth to bedrock.

The intent would be to have this system function as an ecologically superior and rare overwash marsh system:

- a) Test pits to determine extent and composition of fill (Great Island Common side)
- b) Topographical survey to determine flood levels for structures located at abutting properties. Engineering analysis and site plan to determine extent of fill removal, flood hazard analysis, and possible resource changes.
- c) Potential removal of fill to restore Bull Toad's Pond to its former size and function. This may reveal a spring that has been discussed as being historically in the general location (south and west) of the existing pond. Proposed removal of any existing pipes and perhaps dredging the interior of Bull Toad's Pond. Several state/federal permits will be necessary.
- d) Potential introduction of salt water on a regular basis to reduce the invasive species, and promote the functionality of the overwash salt marsh system.
- 3) Salt Marsh Management Techniques

Removal of Fill

Removal of old fill along the edges of the pond would restore the wetland to its former size. However, this could lead to explosive growth of undesirable plant species if the fill removal is not done as part of an integrated restoration project. Test pits or test borings would be done to determine the extent, depth, and composition of the fill and depth to bedrock in the areas where fill is proposed to be removed.

## Control of Invasive Plants

Undesirable plants in the wetland, specifically purple loosestrife and common reed (Phragmites), are difficult to control unless the environment in which they grow is made inhospitable. Without environmental changes, the physical control of these prolific plants is nearly impossible. Use of herbicides can be effective against the target species but may have undesirable non-target consequences.

## Dredge the Pond

Deepening the pond would remove some of the habitat for invasive species along the edges of the open water. Purple loosestrife and common reed can grow in shallow water but are rooted to the bottom, so deep water limits their growth. Removal of the shallow water habitat that surrounds the open water diminishes both wildlife habitat and migratory bird resting opportunities somewhat.

#### Lower the Dune

By reducing the elevation of the dune salt water can be pushed in the pond by smaller storms, increasing the frequency of inundation. This would change the wetland plant species composition in an unpredictable manner. The effects depend on the frequency of the saltwater inundations and the time of year at which they occur. There is the chance that this would allow common reed to expand. There are two plant species of state concern that grow on the dune.

Two possible methods of salt marsh management with salt water introduction

Low cost – however, labor intensive – fire truck draws in salt water and deposits it into Bull Toad's Pond perhaps several times a year.

High cost – however, less maintenance in the future. A large pipe could be installed at elevation below low tide where the ocean would be pushed up the pipe on the incoming tide and drain as the tide recedes. Some controls would be necessary to ensure sand did not block/clog the flow of water.

- 4) Complete a Resource Management Plan for overwash marsh and remnant pitch pine barren, and discuss restoration efforts that may include:
  - a. removal of invasive and/or competing species
  - b. proscribed burning
  - c. educational/interpretive component
  - d. addition of improved trail system
- 5) Implementation of Recommendations in the Management Plan for this area.
- 6) Control of Undesirable Non-Wetland Plants

Control of invasive species outside the wetland, and restoration of the native dune grass ecosystem would be highly desirable. This might be achieved by removing the uppermost soil in the areas where the invasive plants are found; repeated cutting of woody species; controlled burning; or plant-specific herbicide applications. Beach grass would then be planted in the newly exposed areas. To maintain the dune system the dune must not be artificially stabilized. Removing the uppermost soil in some areas would also increase the frequency of overwash saltwater inundation, which would better mimic the historical overwash pond ecosystem.

7) The town may want to consider completing an updated Management Plan for the entire Great Island Common area, to ensure land use decisions are consistent with the recommendations

proposed for this area.

## **Technical Team Recommendations**

The likely history of this site indicates that this site was probably a full salt marsh. The sand dunes have formed over time blocking the tidal flow. An interesting educational project would be to complete cores in the sand dune to determine the history. It is also highly likely that this pond has been freshwater inundated more than saltwater inundated for extended periods of time. On occasion, there have been saltwater inundations.

Overall, it is suggested that the stormwater should continue to flow into Bull Toad's Pond. The stormwater input is a ratio between 10 and 20, which is adequate to maintain a pond of that size. The pond currently does not appear to be full, as is true with most ponds at this time due to the lack of rainfall.

The most significant component of this analysis reveals that it is imperative to address the invasive species problem now.

## Salt Marsh Management

The top of the peat and the bottom elevation of the pond are right at the high tide mark. In salt marshes, the high tide elevation equals the high marsh elevation.

Tidal inundation on a regular basis is at approximately 4.5' NVGD (National Vertical Geodetic Datum), which is the approximate average high tide. The elevation data taken during this project was not related to NVGD. However, based upon observations it appears that the bottom of the pond is approximately 4.5' NGVD, which is the approximate level of the high salt marsh. When managing a constructed or restored salt marsh with daily flooding, a Spartina alterniflora saltmarsh typically forms in three or four years. With this type of salt marsh management, Spartina alterniflora will likely appear within this timeframe.

To pump salt water into the pond will actually only influences the pond area itself. This is good for reducing invasive species within the pond area, but does little to reduce and/or eliminate invasive

species on the fringes of the pond. There are significant invasive species on the fringes of the pond that need to be addressed.

Phragmites australis requires a soil-water salinity of 18 parts per thousand or greater to eliminate. It is actually difficult to control invasive species with simply manipulating the water within the salt marsh, particularly when these plant species are located at higher elevations.

# **Overwash Salt Marsh Management**

The idea is to manage this resource as a better functioning overwash marsh system as overwash salt marshes are very rare to New Hampshire. With the Bull Toad's Pond resource system, there is a relatively small acreage to manage. With an overwash salt marsh system, the hydrology is variable, and this aspect of this system must be understood. During a particular time frame the pond may be freshwater and at other points in time it may be saltwater, or brackish. In addition, stormwater management may be an aspect to incorporate into this project, particularly the introduction of pretreatment systems that regulate the water quality entering Bull Toad's Pond.

Based upon oral history from a few locals that have witnessed Bull Toad's Pond over time, it appears that the overwash pond has overwashed a bit more frequently in the past than it currently is being overwashed. There may be some concern that the sand dune itself has grown to a point where the overwash marsh isn't functioning as it has in the past.

Natural methods to create a breech in the sand dune system include the introduction of an excessive amount of freshwater or saltwater during ocean storm events.

If you want to manage Bull Toad's Pond as an overwash salt marsh, one method would be to place a riser on the beachside that allows water to flow into the pond through a buried pipe (see Appendix F). The engineering and permits required for this type of restoration effort are expensive. For the small acreage within the Bull Toad's Pond watershed, this management technique would result in a significant expense.

# **Invasive Species Management**

In the removal of invasive species – a schedule would need to be developed for removal of particular species.

There have been significant changes to the vegetation behind the dune (closest to Bull Toad's Pond), and there are probably significant changes in the nutrient levels as well. These changes affect the functionality of this entire resource system.

Probable Methods for eliminating Invasive Species

Scraping:

There is the possibility to scrape off approximately 1' of a particular section of the existing dune (close to the back dune area) where organic material has developed and built up over time. This is also where many of the majority of invasive species are located. This type of management regime shouldn't displace the existing dune grass. In addition to this scraping of the existing back dune area, additional plantings of native species (i.e., beach grass) would be necessary.

Saltwater Introduction:

The introduction of saltwater will only impact the pond area of Bull Toad's Pond and this method could take a significant amount of maintenance. One technique would be to have the fire department pump salt water into the pond, and let the water sit for a significant amount of time. If a large rain event occurred sometime soon thereafter, another salt water pumping would be necessary. In addition, this method may require additional maintenance on the fire equipment being used to pump the salt water. This management method for controlling invasive species would require consistent maintenance each year. In addition, it is equally as likely that pumping salt water into this system would not be enough to keep this system functioning as a salt marsh. There have been cases with other salt marsh restoration projects where tidal flooding occurs two times a day, and yet the Phragmites is not completely eliminated around the edges of the saltmarsh.

Herbiciding:

Herbicides can control invasive species. There are types of herbicides that contain formulations of Glyphosate that can be used in and around wetlands. There are a couple of products that have been

approved for use within or adjacent to a salt marsh, and they are required to be used by a licensed applicator.

These products are inactivated by soil. They are relatively benign herbicides that are broken down in the soil. These products are systemic herbicides, as the material goes down to the root and kills the plant. The important distinction with these herbicides is that they are not specific to particular species, and it is important that wicking be promoted or selective hand spraying. A special permit to apply these herbicides would be necessary through the New Hampshire Division of Pesticide Control.

To eliminate Poison Ivy for example, a licensed applicator with rubber boots would come to the site sometime while the leaves are growing (June, July, August, September) and wick a small amount of herbicide onto each plant. The care taken in wicking each plant is important, and it will likely take two applications during the growing season. This does not involve a massive spraying technique, and the entire plant need not be coated. The length of time needed to complete the entire herbiciding management program is likely two to three seasons, as the seeds from Poison Ivy sprout readily. In fact, yearly maintenance applications may be necessary with this method of invasive species control.

### Manual Cutting:

Cutting the Staghorn Sumac, and then painting the stems with herbicide so they don't come up again is another method to utilize herbicide. In addition, prescribed burning techniques can help with reducing the amount of Staghorn Sumac that currently exists.

## **Pitch Pine Restoration**

Habitat restoration of some of the pine barren is a goal worthy of consideration. In order too maintain the pine barren ecosystem, occasional controlled burning is necessary to limit undergrowth.

The area delineated on the site map (see Map 2) would likely be more open and park like with a restoration effort of the Pitch Pine. Currently there are a lot of invasive and aggressive species that are squeezing out the pitch pine. The visibility of the area would be more aesthetically pleasing and more attractive with the invasive species removed. Prescribed burning is one method to promote additional growth of the Pitch Pine and remove much of the invasive species. Hand cutting or mechanical cutting of the invasive species and woody vegetation and vines in and around the Pitch Pine is another method

to consider. The prescribed fire management method must be completed carefully. The local fire department may enjoy participating in a prescribed burn exercise and will likely promote the success of this restoration method.

## **Final Suggested Course of Action**

Short Term Restoration Technique

The goal is to complete a restoration technique that shows immediate results in which the town can actively participate.

It is suggested that the town complete a demonstration project as a first step, for eliminating invasive species using different techniques, including herbiciding. The idea would be to pick out specific areas, at a small scale, perhaps ten 10' x 10' plots around different invasive species and then use different elimination techniques.

Three different invasive species elimination techniques would include:

- e. Mechanical cutting and application to the stems
- f. Scraping off the top part of the back dune and planting native species
- g. Herbicide treatment of invasive plants
- 1) For example, Phragmites could be hand cut in the fall, and then when it comes up in the spring it could be wicked with an herbicide.
- 2) Staghorn Sumac could be cut by hand, and then an application of herbicide could be painted onto the stem so that it doesn't come up again.

3) Poison Ivy - see explanation above.

# **Long Term Restoration Technique**

Remove fill that has been placed in and around Bull Toad's Pond, with the idea of expanding the Bull Toad's Pond area to closer to the original size. This will also remove some invasive species.

First, the town will have to have a complete topographic survey. The next step would be to have test pits completed to determine the extent and type (to determine that the material is not hazardous) of fill found on the Great Island Common side of the pond. The fill probably starts at around 4.5' NVGD because that is the approximate bottom elevation of the original marsh.

Fill could then be removed and native plants would be planted in its place. This method will not require a lot of future maintenance (perhaps additional plantings and control of invasive species). It may be necessary to remove fill from Bull Toad's Pond itself, and several federal and state permits will be required for this course of action.

Resource Management Plan:

- 1) Restore the ecological functionality of Bull Toad's Pond
- 2) Remove invasive species longer term maintenance
- 3) Restore the pitch-pine barren this can be completed sometime after the invasive species are controlled. There are additional invasive species (bittersweet, poplar, oak) that can be removed (this can be completed with volunteer labor).

NRCS can help with the general outline for a management plan to tackle these three items.

<u>Technical Team Recommended Phase I and Rough Cost Estimates:</u>

1) Control the Invasive Species

a) Demonstration Program – showing minimal offsite effects

This is a good selling point for a funding application for the following year. A licensed applicator will be required, and approximately \$500 (roughly estimated) or so to complete one year active growing season applications. A special permit application – Aquatic will also be necessary from the NH Division of Pesticide Control of the NH Department of Agriculture, Markets & Food.

The Town will need to stake out areas, and then hire a contractor to treat at least 2 times during the season.

The Town may want to watch this application at the onset and throughout the growing season. In addition, during this time it will be crucial that the Town actively educate neighbors, and folks that visit the Great Island Common so that questions can be easily answered. This demonstration project should be completed next summer, and will provide ample evidence for a full application for funding during the following year.

Demonstration Project: Potential cost will be approximately \$500 to hire a licensed applicator to complete the project within one growing season.

- b) If successful the first year, a full herbiciding program should be promoted the following year.
- 2) The town may want to have additional research completed by a wetland scientist/ecologist to research and document information necessary to report rare plants and/or natural community for inclusion on the Natural Heritage Data list.

Wetland Scientist and/or Ecologist cost for fieldwork and write-up necessary to complete the required information for inclusion on the Natural Heritage Data list approximately \$2000.

3) Complete a Management Plan or Master Plan for Great Island Common to include a Resource Management Plan for the Bull Toad's Pond and the pitch-pine area.

Resource Management Plan for above may run somewhere between \$5,000 and \$8,000 depending on method of inventory, number of hours, and types of mapping resources offered.

4) Stormwater Control - The town may want to proceed with a more detailed application for pretreatment of the stormwater entering Bull Toad's Pond.

See Section on Stormwater Analysis for a more detailed description of possible stormwater management techniques.

Potential cost depends upon type of stormwater system chosen.

For any work that is completed on the dune, a NH DES wetlands permit will be necessary, and will require an additional cost. A review of each of these proposed management techniques with NH DES must also be completed to determine their applicability.

## Technical Team Recommended Phase II:

1) To determine if removal of fill is possible. Removal of fill could cost hundreds of thousands of dollars (approximately \$10-12 dollars per cubic yard to remove) as long as it is not hazardous material. Approximately 8 – 10 test pits must be completed first to see if there are any removal and/or disposal concerns. To understand what is there test pits and an assessment for the potential for groundwater pollution must be completed. Soil testing for hazardous residue might also be important in this area. Permits may be also necessary for the test pits. Native plants must be planted once the fill is removed. If fill is removed from Bull Toad's Pond – an Army Corps of Engineers (ACOE) Section 404 permit will be necessary. Additional permits or concurrence from the EPA, US Fish and Wildlife, and NH DES Wetlands Permit may also be needed.

Cost Estimates: A very rough estimate for the total cost of fill removal could range from \$50,000 to \$100,000. Additional costs for permits and planting would be likely.

## Funding Ideas for the priority recommendations

This site may be added to a list of possible wetland mitigation area - as a suggested alterative to finding funding to do this part of the project (dredge and fill removal)

In addition, funding sources for several of the Phase I recommendations include:

Fuller Foundation
Seabrook Nuclear Plant
Coastal Program – with a 50% required match or through the Rockingham Planning Commission.
New Hampshire Estuaries Project
NH DES
Funds collected from the money collected at Great Island Common (Great Island Common Fund) may also be utilized at the Town match funds for possible applications and for Phase II.
Possible services from contractor willing to donate time and equipment may also be used as potential matching funds for possible applications (likely applications for Phase II projects).
Estimated/Rough Time Frame
New Castle Great Island Common Projects
Much is dependent upon local match funding being available prior to times indicated in this schematic.
Phase I:
1) Demonstration Project
Begin Special Permit, Spring 2002
Town to stake out demonstration areas, spring, early summer 2002

Town to initiate educational campaign spring, early summer 2002

Town to hire licensed pesticide applicator to complete one full growing season for demonstration plots, late spring, 2002.

Town to photograph/document changes throughout project and at end of summer/fall 2002.

- 2) Possibly hire wetland scientist/ecologist to complete inventory of rare/endangered plants/communities, early summer 2002.
- 3) Master Plan/Management Plan for Great Island Common to include Resource Management Plan for Bull Toad's Pond and Pine pitch barren.

Apply for NH Coastal Program Grant, Winter, 2002

Begin inventory process, Summer, 2002

Planning process to occur through winter, 2003.

Phase II:

Once the Master Plan/Management Plan is completed and the results of the demonstration project are completed – work with the NRCS, NH Coastal Program, NH Estuaries Project, and RCCD on the next step for the permitting process for enhancement/restoration of the Bull Toad's Pond area, and complete more detailed engineering, topographic, and construction estimates. Timeframe is likely Winter-Spring 2003.

## Conclusion

The suggested second phase for wetland restoration and habitat enhancements are not simple. Design, permitting, and construction will not be simple. This report is not intended to detail the process, but is an outline on which to begin the discussion. It should be noted that although the second phase of wetland restoration may at first glance seem out of reach, financially, there are finances available to complete this type of project. The only way that a restoration project of this scope can be accomplished is if there is strong local support and interest in completed it.

There are adjacent and nearby successful restoration projects that have been completed on the coast of New Hampshire. Discussions with other Conservation Commissions on salt marsh restoration/management techniques and funding efforts might be another factor for the New Castle Conservation Commission to consider in order to get a sense of the scope of the proposed project.

A wetland restoration option needs to be selected which is achievable; provides superior ecological function when compared to the present situation; is supported by affected parties; and which presents educational/research opportunities. This report does not present every possible option, but should help the interested parties in making a selection that will result in significant ecological gain.

Habitat functions of the wetland would be further enhanced by the restoration of the adjacent sand dune and pitch pine barren. In fact, the close proximity of the three unusual habitats - the overwash pond, the sand dune, and the pitch pine barren - presents a wetland restoration and ecological enhancement opportunity that may be unique in New Hampshire.

It is hoped that the interested parties will come to a broadly supported agreement to improve the ecological functions and enhance the wetland values at Bull Toad's Pond.

If the Town of New Castle chooses to move ahead, the next steps with the proposed Phase II would be design and permitting of the enhancement/restoration; cost estimation for construction; selecting contractors for construction; construction and construction oversight; installation of educational component; and a long term monitoring protocol.

## **Acknowledgements**

The primary authors of this report are Tracy Degnan, RCCD, Michael Cuomo, RCCD and Edwin Minnick, RCCD. RCCD administered the grant, provided editorial guidance, gathered historical information, and maintained contact with the New Castle Conservation Commission. Engineering and technical support was provided by Ed Minnick, RCCD. Natural resource interpretation, suggestions for ecological enhancement, and editorial suggestions were made by Alan Ammann, NRCS, and Dave Burdick, UNH.

This project would have been impossible without the time and assistance donated by the New Castle Conservation Commission. Many long-time residents of New Castle also related their memories of how Bull Toad's Pond has changed over the years.

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### Deeds:

Book 1859, Page 570 between the United States of America, through the Administrator of General Services and the Town of New Castle

Book 1539, Page 351 between the United States of America, through the Administrator of General Services and the Town of New Castle.

Book 1656, Page 156 between the United States of America, through the Administrator of General Services and the Town of New Castle